

TM 9-4910-448-10

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR'S MANUAL

INCLUDING BASIC ISSUE ITEMS LIST

TEST SET, GENERATOR AND
VOLTAGE REGULATOR,
AUTOMOTIVE (ALLEN
ELECTRIC AND EQUIPMENT
CO. MODEL 30-82)

(4910-270-3780)

<p>This copy is a reprint which includes current pages from Change 1.</p>

HEADQUARTERS, DEPARTMENT OF THE ARMY

APRIL 1965

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 5 April 1965

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NG: None

USAR: None

For explanation of abbreviations used, see AR 320-50.

CHANGE
No. 1



HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 11 January 1973

Operator's Manual
TEST SET, GENERATOR AND
VOITAGE REGULATOR, AUTOMOTIVE
(ALLEN ELECTRIC AND EQUIPMENT CO.
MODEL 30-82)
(4910-270-3780)

This change is current as of 4 December 1972

TM 9-4910-448-10, 5 April 1965, is changed as follows:

The items in the following table, formerly included as part of the Basic Issue Item List on page 19, are now designated as components or part of the end item configuration. All items are manufactured by Allen Electric and Equipment Company (Manufacturer's Code 01216).

Part
CLIP, BATTERY: w/terminal bolts
LEAD, JUMPER: 5 in. lg
LEAD, JUMPER: 9 in. lg
OPERATING INSTRUCTIONS:
SHUNT: 120 amp

Part No.
A11249
A21324
A6875
25315
A68312

Page 17. The APPENDIX, Basic Issue Items List, is resinded.

Reporting of Errors. You can improve this manual by calling attention to errors and by recommending improvements using DA Form 2028 (Recommended Changes to Publication) or a letter mailed direct to Commander, US Army Weapons Command, ATTN: AMSWE-MAS, Rock Island, IL 61201. A reply will be furnished direct to you.

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CONARC (3)
ARADCOM (2)
ARADCOM Rgn (2)

LOGCOM (3)
OS Mgt Comd (1)
Armies (3) except:
Seventh (3)
Eighth (3)
USABCEB (2)
DEAD (2)
CBAD (1)
TEAD (16)
4th USASA Hq Sta (1)
Units org under 1st TOE:
S-27B (2)

ARNG & USAR: None.

For explanation of abbreviations used, see AR 310-50.

OPERATING INSTRUCTIONS

MODEL 30-82

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OPERATING INSTRUCTIONS

ALLEN Model 30-82

GENERATOR, VOLTAGE REGULATOR TEST SET

The Allen Model 30-82 Generator, Voltage Regulator Test Set is designed to test on the vehicle nonwaterproof 6, 12, and 24 volt electrical systems of passenger and commercial type vehicles. Note: The vehicle's battery must be serviceable and fully charged prior to performing tests on the charging system.

The Allen Model 30-82 Heavy Duty Test Set consists of: a Voltmeter, Ammeter with an external Shunt, adjustable Carbon Pile with a Push to Operate Switch, adjustable Field Rheostat, four selectable Fixed Resistances, and accessories to facilitate connecting the Test Set to the vehicle.

Each circuit of the Test Set terminates with separate leads, allowing universal connection procedure.

Leads are color coded as follows:

1. Field Rheostat leads terminate in GREEN insulators.
2. Fixed Resistance leads terminate in YELLOW insulators.
3. Voltmeter leads terminate in a RED and a BLACK insulator.
4. Load Control leads terminate in SPADE terminals.
5. Ammeter lead terminates in a NON-POLARIZED PLUG.
(For use with external shunt)

VOLTMETER CIRCUIT

The Voltmeter has three (3) scales. A rotary selector switch is provided to select either the 8 volt range for 6 volt s systems, 16 volt range for 12 volt systems, or 32 volt range for 24 volt systems. The Black Insulated Clip is Negative and the Red Insulated Clip is Positive. The Black Clip is attached to Ground on Negative Ground System, and the Red Clip is attached to Ground on Positive Ground System.

AMMETER CIRCUIT

The Ammeter has three (3) scales. The -8 to + 120 amp., top scale, is to be used with the 120 ampere external shunt furnished. The Ammeter lead terminates in a two (2) prong plug which is inserted into the external shunt. (Continued next page)

AMMETER CIRCUIT (continued)

The polarity of the Ammeter circuit may be reversed by removing the plug, which is non-polarized, and turning a half turn (180 degrees) and re-inserting it into the shunt socket. The heavy spade terminals of the external shunt are connected in series with the vehicle's circuit being tested.

FIXED RESISTANCE

Four (4) values of Fixed Resistance continuously rated at four (4) amps., to 10 amps. intermittent, are provided as follows: 3/4 OHM, 1 1/2 OHM, 2 1/4 OHM and 7 OHM. A Selector Switch is used to select the proper resistance for inserting in place of the vehicle battery when checking the electrical settings of current voltage (C/V) units. These resistors are actually load resistors, and should be selected and connected prior to energizing the circuit under test.

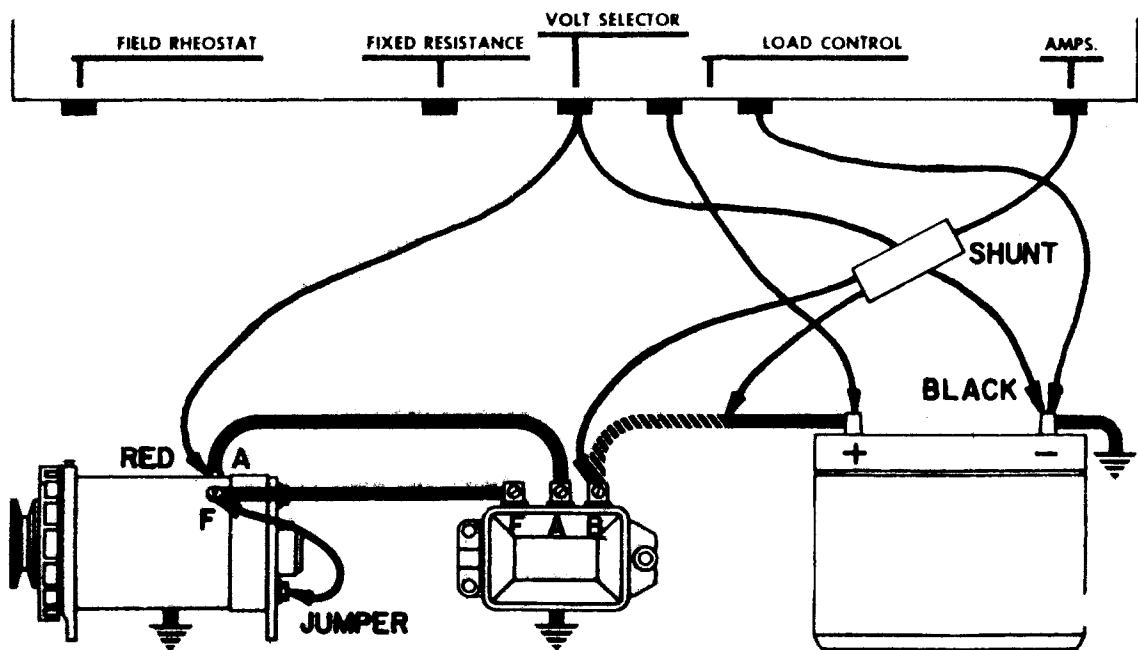
LOAD CONTROL

The Load Control is an adjustable, heavy duty, carbon pile rheostat having a Push to Operate Switch in series for testing Current Regulators. Its rating is 24 volts at 25 amperes, and has an intermittent duty rating of 1,000 watts. The Load Control knob should ALWAYS be in the maximum counter clockwise (high resistance) position BEFORE activating the Push to Operate Switch, and should be returned to the counter clockwise position before the Push to Operate Switch is released. The Load Control is connected in parallel with the vehicle's battery and is used to vary the current output of the charging system. The Load Control may also be connected in series with the battery lead to reduce the current output of the charging system when checking or adjusting the Voltage Regulator.

FIELD RHEOSTAT

The Field Rheostat is a taper wound variable resistor for use in the field circuit. It has a range of from zero (0) to fifty (50 ohms with a completely "open" position at its maximum counter clockwise rotation. The circuit is protected by the use of a 5 amp., overload circuit breaker having an automatic re-set. The adjustment of the Field Rheostat makes possible the complete control of the Generator Field Current, thereby duplicating the control function of the vehicle's regulator. It is also used to check the cut-in and cut-out voltage setting of the cut-out relay or field relay of the system.

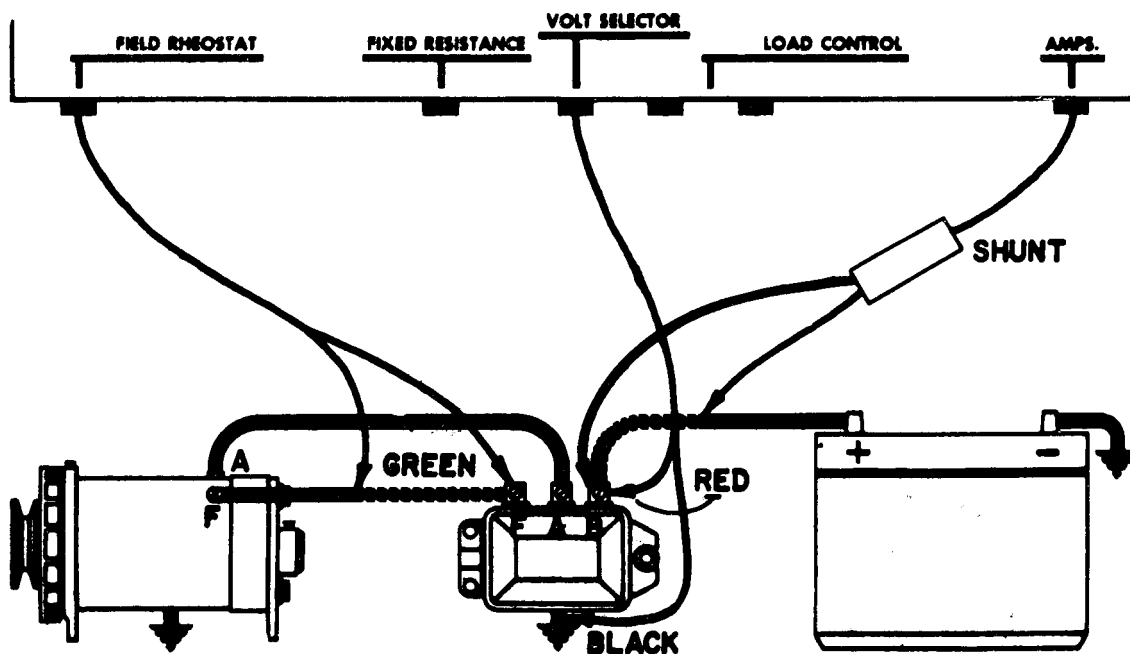
NOTE: No attempt has been made to provide, in this manual, any specifications applying to the various component parts of the charging system. The manufacturer's specifications should be consulted and the setting of the unit made according to the figures listed for the SPECIFIC unit being checked.



GENERATOR OUTPUT TEST

FIGURE 1

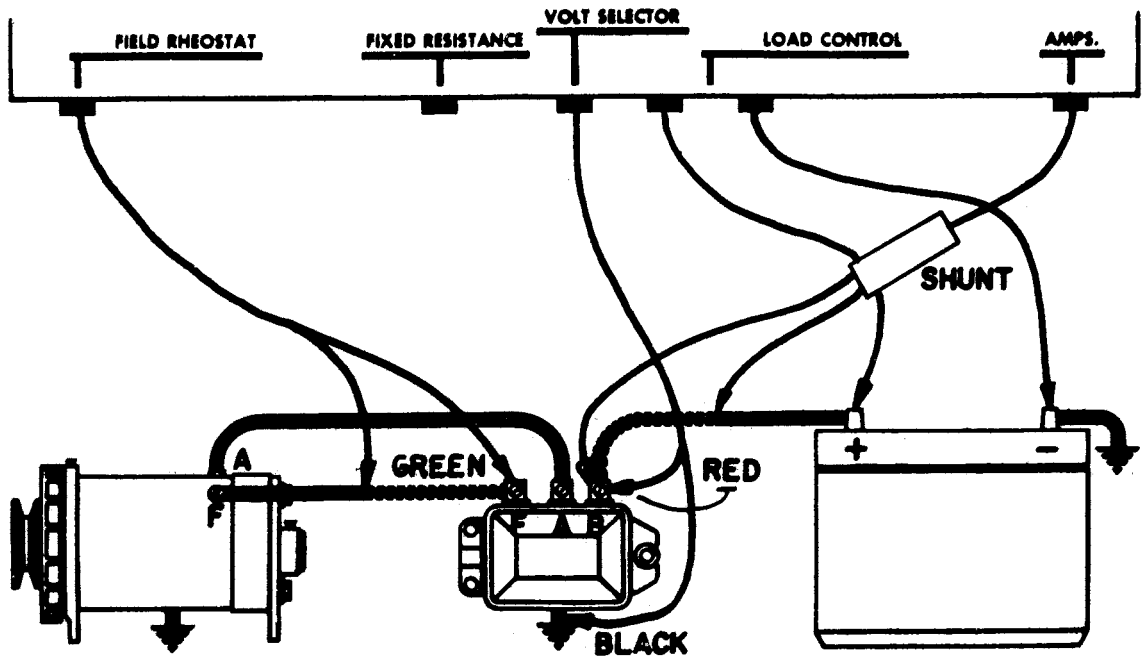
1. Set Volt Selector Switch to correspond with voltage on vehicle. Connect Volt Leads as follows for Negative Ground Systems. (Reverse Leads for Positive Ground Systems.)
 - A - Positive (RED) to Armature Terminal on Generator
 - B - Negative (BLACK) to a good Ground
2. Connect shunt in series with the battery lead and "BAT" terminal of Regulator.
3. For externally grounded field Generators (A circuit) connect jumper wire from Generator field (F) Terminal to Ground. For internally grounded field Generator (B circuit and Ford products) connect jumper wire between field (F) and Armature (A) terminals.
4. Turn on Vehicle lights to prevent excessively high voltage, start and operate engine at sufficient speed to produce rated Generator output. Use Load Control if necessary.
5. Refer to manufacturer's specifications and do not exceed maximum rated output.



VOLTAGE REGULATOR TEST

FIGURE 2

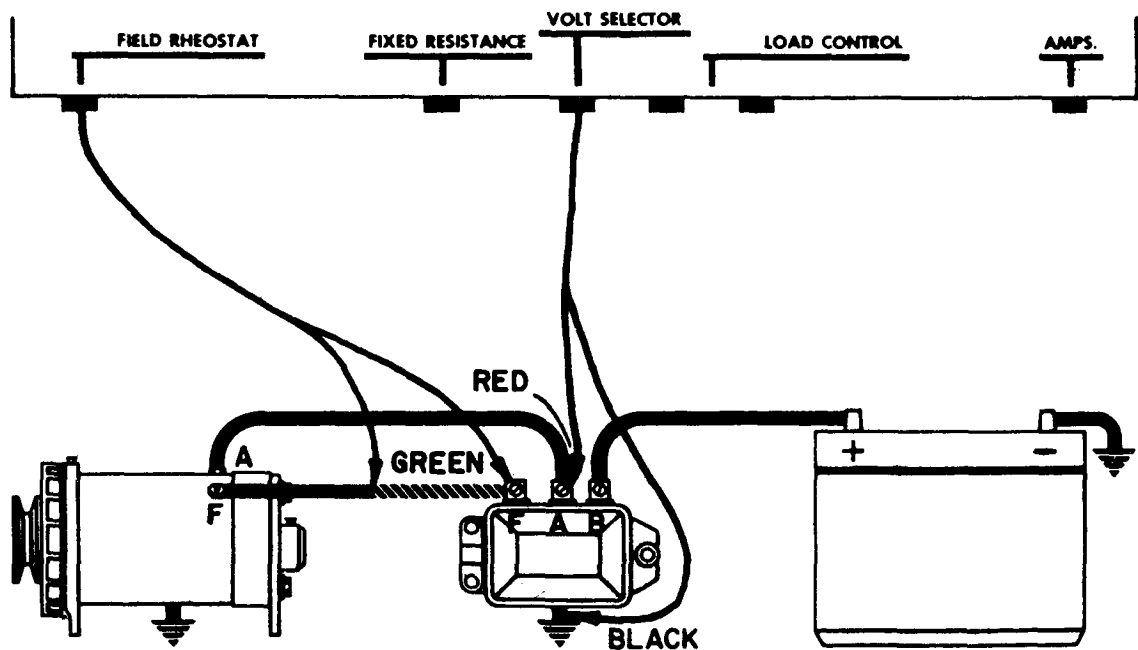
1. Set Volt Selector Switch to correspond with Voltage on Vehicle. Connect Volt Leads as follows for Negative Ground Systems. (Reverse Leads for Positive Ground Systems.)
 - A-Positive (RED) to "BAT" Terminal on Regulator
 - B-Negative (BLACK) to a good ground.
2. Connect shunt in series with Battery Lead and "BAT" Terminal on Regulator, (If needed use Load Control in Series with Shunt and "BAT" Terminal of Regulator.)
3. Connect Field Rheostat Leads in series with Field Lead and "FLD" Terminal on Regulator.
4. Run Generator to get the current flow recommended. (If Current Flow is excessive, reduce by connecting and adjusting Load Control.) If required, bring Regulator to operating temperature with cover on.
5. Operate Generator at required speed. Slowly increase Field Rheostat until voltage is reduced to specified amount for system being tested. Return Field Rheostat to "OFF" Position and note Voltage Setting.
6. Refer to manufacturer's specifications for details and adjust as required.



CURRENT REGULATOR TEST

FIGURE 3

1. Set Volt Selector Switch to correspond with Voltage on Vehicle. Connect Volt Leads as follows for Negative Ground Systems. (Reverse Leads for Positive Ground Systems.)
 - A-Positive (RED) to "BAT" Terminal on Regulator
 - B-Negative (BLACK) to a good Ground
2. Connect shunt in series with Battery Lead.
3. Connect Field Rheostat Leads in series with Field Lead and "FLD" Terminal on Regulator.
4. Connect Load Control Leads across Battery with Clips supplied with Test Set.
5. If required, bring Regulator to Operating Temperature with Cover On.
6. With lights on, turn Load Control to Drop Voltage - approximately 1 Volt below the Voltage Regulator Setting.
7. Cycle Generator with Field Rheostat and note Current Setting.
8. Refer to manufacturer's specifications for Proper Setting.



CUTOUT RELAY TEST

FIGURE 4

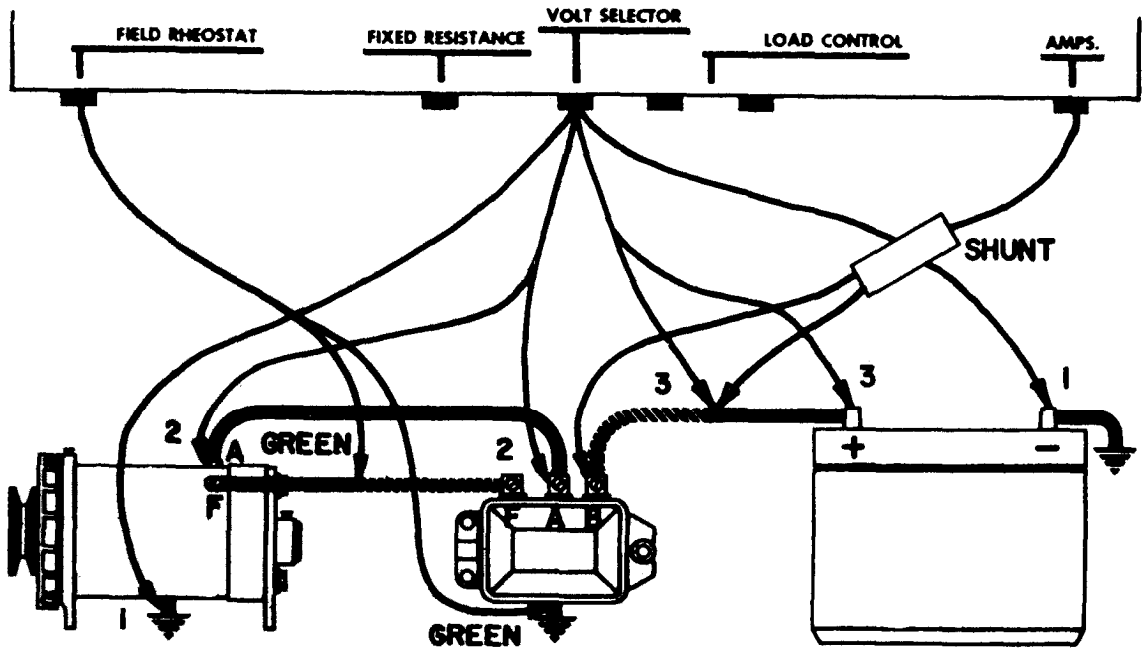
1. Set Volt Selector Switch to correspond with voltage on Vehicle. Connect Volt Leads as follows for Negative Ground Systems. (Reverse Leads for Positive Ground Systems.)

- A-Positive (RED) to "GEN" Terminal on Regulator
- B-Negative (BLACK) to a good Ground.

2. Connect Field Rheostat in series with Field Lead and "FLD" Terminal on Regulator.

3. Run Generator at a medium speed with Field Rheostat turned fully clockwise. Slowly decrease Rheostat until points close. Note closing Voltage. Slowly Increase Rheostat to make sure Points Open. Alternate method to check Cutout Relay. Omit use of Field Rheostat. Slowly Increase speed of Generator and note relay Closing Voltage. Decrease speed of Generator and make sure Relay Points Open.

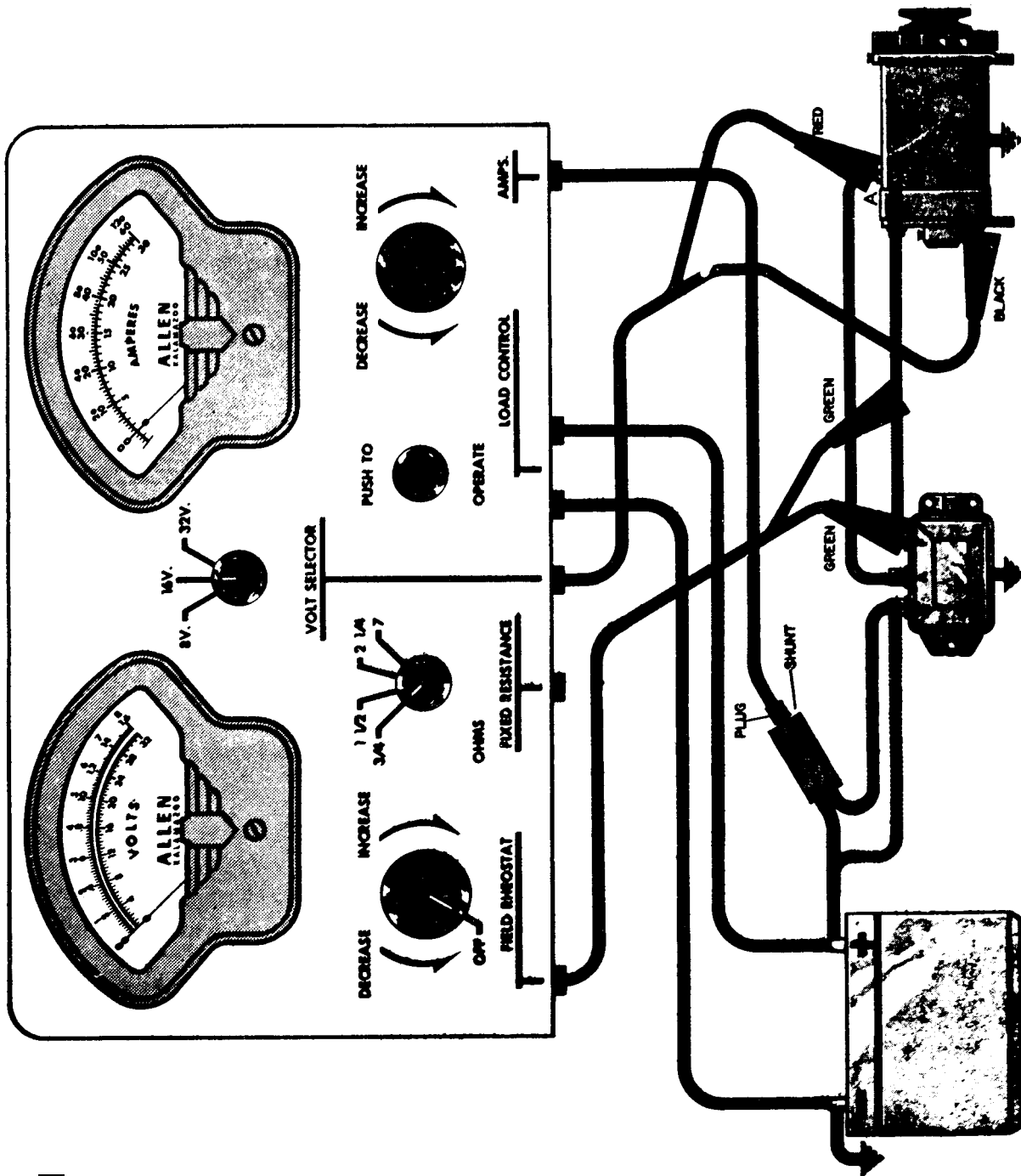
4. Refer to manufacturer's specifications for Proper Setting.



VOLTAGE DROP IN CHARGING CIRCUIT

FIGURE 5

1. Disconnect the Field Lead at Regulator and connect Field Rheostat Leads between this Lead and Ground. Place Field Rheostat in "OFF" Position.
2. Connect Shunt in series with Battery Lead and "BAT" Terminal on Regulator.
3. With accessories Off, adjust engine speed and Field Rheostat to obtain sufficient current flow. It may be necessary to place the Load Control across the Battery to obtain the 15-20 Amperes required.
4. Place Voltmeter in 8 V. Position and measure Voltage Drop at 1-1, 2-2, and 3-3, by connecting Volt Leads as shown in above Figure. If Voltage Drop exceeds manufacturer's specifications (normally .1 - .3 volts) Check wiring and connections for excessive resistance.
5. Return Field Rheostat to "OFF" and stop engine. If required clean and tighten all connections and replace Leads.



CONNECTION PROCEDURE

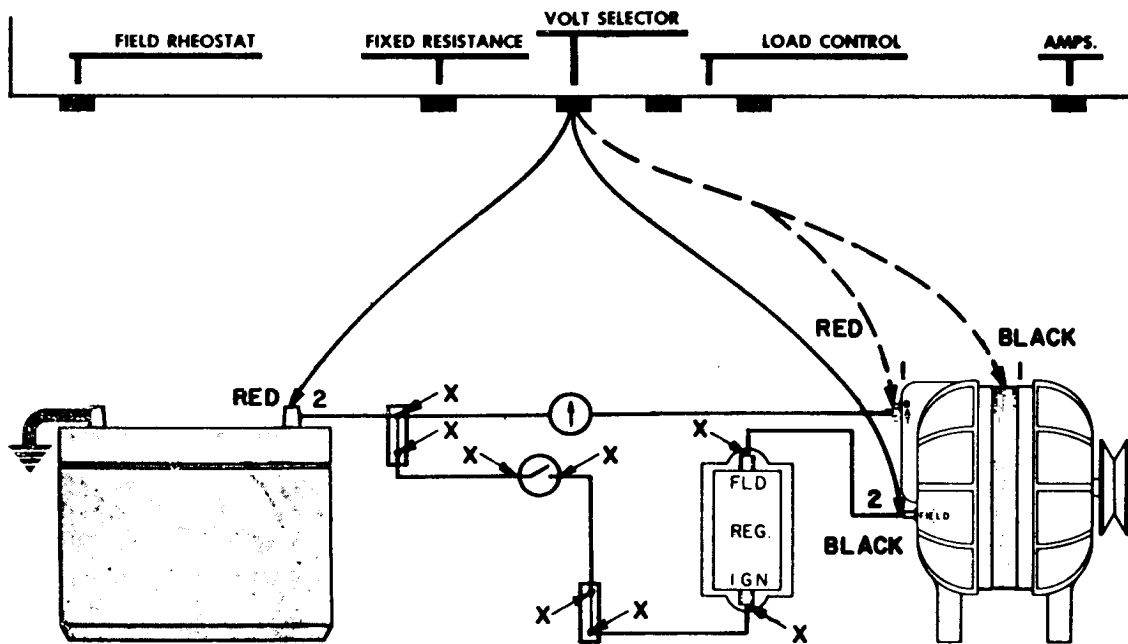
1. Preset all Controls as Follows:

- A. Field Rheostat to its maximum clockwise (right) Rotation.
- B. Load Control to "OFF" Position. (Maximum counterclockwise (left) Rotation.
- C. If fixed Resistance is required, turn Fixed Resistance Switch to Resistance needed.
- D. Set Volt Selector Switch to correspond with voltage on Vehicle.

2. Connect Leads as Follows:

- A. Connect shunt in series with Battery Lead and "BAT" Terminal of Regulator.
- B. Connect the Field Rheostat Lead in series with the Field Lead and "FLD" Terminal of Regulator.
- C. Connect Volt Leads as follows for Negative Ground Systems. (Reverse Leads for Positive Ground Systems.)
 - 1. Positive (RED) to "ARM" Terminal of Generator or Regulator.
 - 2. Negative (BLACK) to Good Ground.
- D. Connect fixed Resistance when required to substitute Battery in series with Battery Lead and Shunt.
- E. Connect Load Control Leads across the Battery.
- F. Proceed with test as outlined on previous pages 3 - 4 - 5 - 6, and 7) Refer to manufacturer's specifications and proceed with Test.

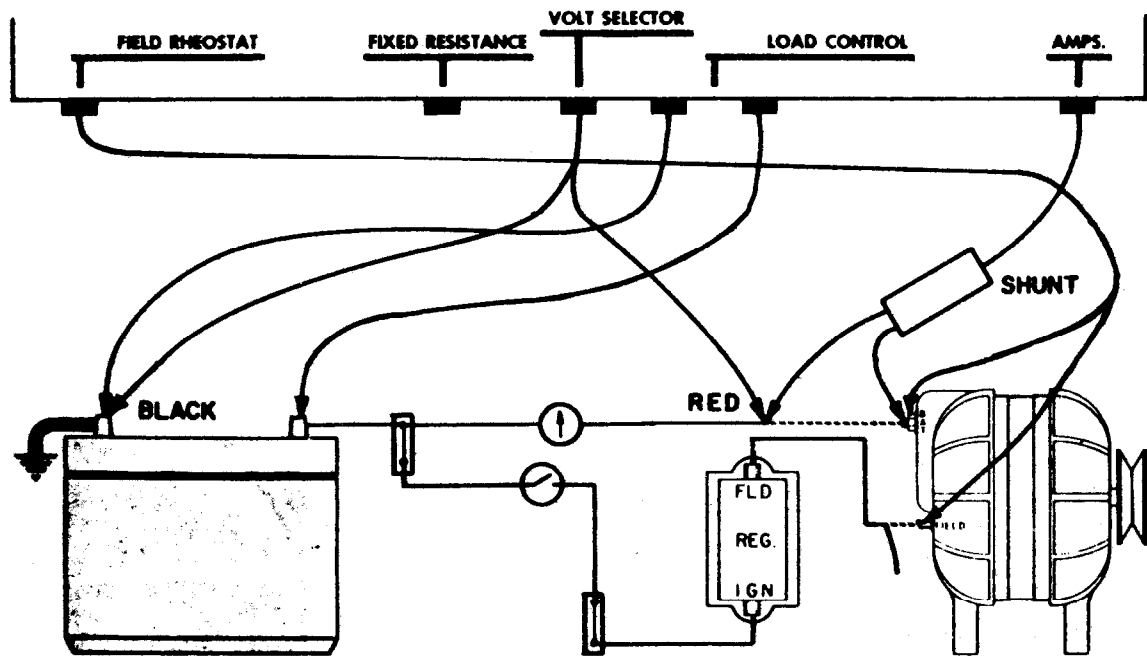
ALTERNATORS Before making tests on Alternator Charging Systems, the Battery should be fully charged and Belt Tension properly adjusted. Make a Preliminary Check to see if Alternator is charging by connecting Voltmeter Leads across Alternator's Battery Terminal and Alternator's Frame. Observe Polarity. Read Voltmeter, start engine, increase speed and note if voltage increases. Always Disconnect the Battery Ground Cable before Removing the Harness Connections at the Alternator. After Test Leads are hooked-up, reconnect Battery Ground Cable.



FIELD CIRCUIT RESISTANCE TEST

FIGURE 7

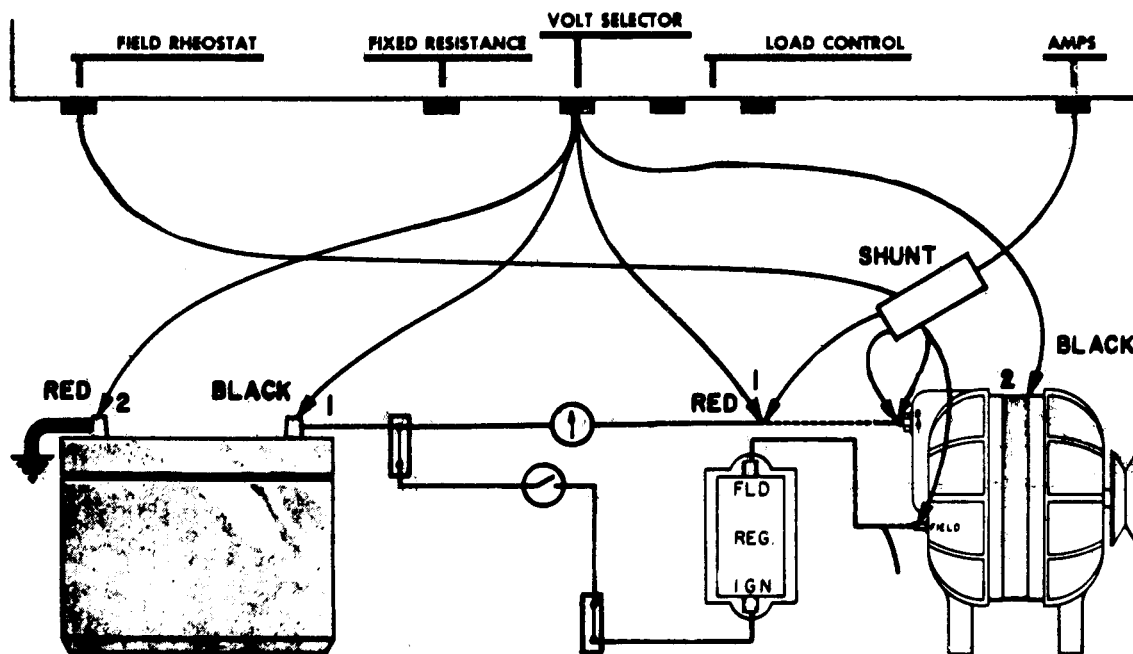
1. Stop Engine and connect Positive Voltmeter Lead to Positive Battery Terminal and Negative Voltmeter Lead to Field Terminal of Alternator. (Reverse Leads for Positive Ground Systems.)
2. Disconnect Coil Primary Lead to prevent Current Flow in Ignition Circuit and (Turn Off all Accessories including Dome and Courtesy Lights.)
3. Turn Ignition Switch "ON", Place Volt Selector Switch in 8 Volt-Position and read Meter. (Not applicable on some systems using Charge Indicator Light.)
4. If Voltage Drop exceeds Manufacturers Specifications, use Negative Voltmeter Lead and work back to the Battery, Checking each connection (Marked with "X") in Field Circuit until High Resistance (Excess Voltage Drop) is Found.



ALTERNATOR FIELD DRAW AND OUTPUT TEST

FIGURE 8

1. Remove Battery Ground Cable. Remove Battery Lead at Alternator and connect Shunt in Series with Battery Lead and Bat. Terminal on Alternator.
 2. Connect Negative Voltmeter Lead to a good Ground and connect Positive Voltmeter Lead to Battery Lead removed from Alternator. (Reverse Leads for Positive Ground Systems.)
 3. With Load Control Turned fully Counter-Clockwise, Connect Leads across Battery (Use Clips supplied with Test Set.)
 4. Disconnect Field Lead at Alternator and with Field Rheostat in the "OFF" Position, Connect Leads between "FLD." Terminal and "BAT" Terminal on Alternator.
 5. Turn off all Accessories, Reconnect Battery Ground Cable. Check Field Current Draw by turning Field Rheostat to extreme Clockwise Position and note Amp. Reading. Refer to Manufacturers Specifications.
 6. If Field Draw is Normal,. Start Engine and refer to Manufacturers Specifications for proper engine speed and Current-Voltage Reading that should be obtained from Alternator. To Load Alternator use Load Control and Lights if necessary.
- NOTE: (This Test Should Be Performed as Quickly as Possible. Do Not Exceed Voltage Rating.)

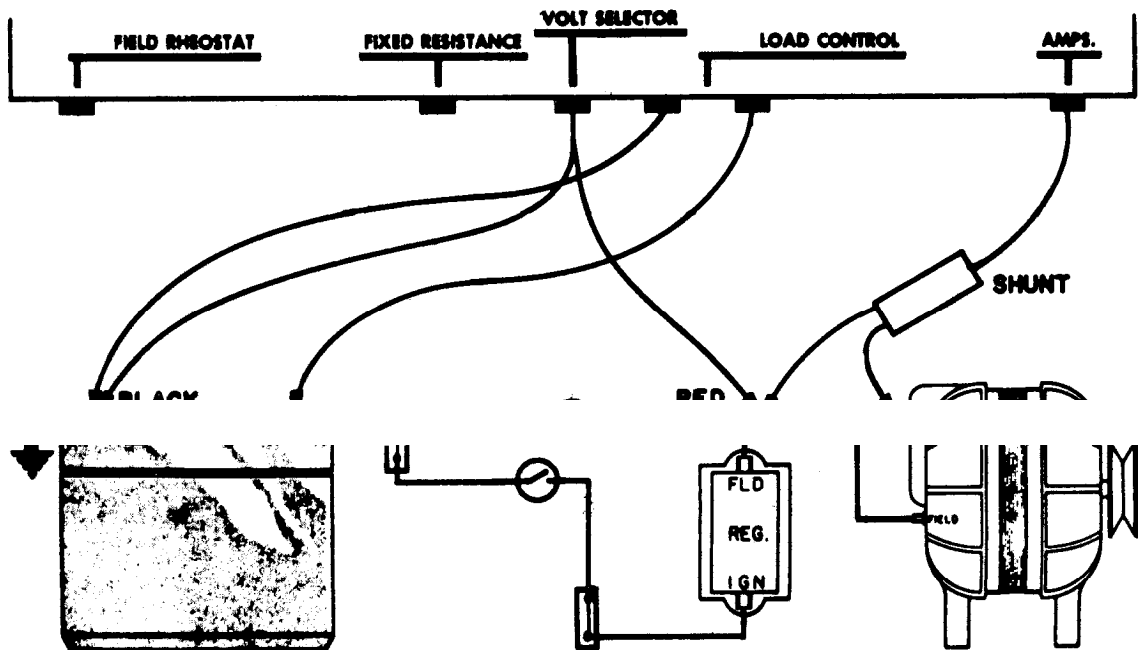


CHARGING CIRCUIT RESISTANCE TEST

FIGURE 9

1. Remove Battery Ground Cable. Remove Battery Lead at Alternator and connect Shunt in Series with Battery Lead and "BAT" Terminal on Alternator.
2. Disconnect Field Lead at Alternator. With Field Rheostat in the "OFF" Position, connect Rheostat Leads between "FLD" and "BAT" Terminals on Alternator.
- 3(a). To Test Insulated Battery Lead, connect Negative Voltmeter Lead to Insulated Terminal on Battery and Positive Voltmeter Lead to Battery Lead Removed from Alternator (1-1). (b). To Test Ground Circuit, connect Negative Voltmeter Lead to Alternator Frame and Positive Voltmeter Lead to Battery Ground Post (2-2).
4. Reconnect Battery Ground Cable. Start and Run Engine after each above hookup increasing Field Rheostat until specified Current reading is obtained on Ammeter. Voltmeter will show Voltage Drop in Charging Circuit, (1-1) and (2-2). If Voltage Drop is excessive according to Manufacturer's Specifications, clean and tighten all connections and Retest the Charging Circuit.

Field and Light Relays may be checked by Disconnecting All Leads to Relay or Regulator and connecting Field Rheostat Leads between Insulated Battery Terminal and Relay Terminal with Voltmeter across Relay Terminal and Ground. Turn Field Rheostat Clockwise from "OFF" until Relay Closes, Note Voltmeter Reading. Refer to Manufacturer's Specification on the Relay under test.



ALTERNATOR VOLTAGE REGULATOR TEST

FIGURE 10

1. Remove Battery Ground Cable. Remove Battery Lead at Alternator and connect Shunt in series with Battery Lead and "BAT" Terminal on Alternator.
2. Connect Negative Voltmeter Lead to Battery Ground and Positive Voltmeter Lead to Battery Lead removed from Alternator. (Reverse for Positive Ground Systems).
3. With Load Control turned fully Counter-clockwise, connect Load Control Leads across Battery. (use Clips supplied with Test Set) Reconnect Battery Ground Cable.
4. Turn off all accessories, Start and Operate Engine until the Temperature of the Regulator has been Normalized. Stop the Engine. Start the Engine, use Load Control to obtain required Current reading, and Read Voltmeter (also Regulator Temperature when required). Refer to Manufacturer's Specifications for required Voltage. This Test Must be performed with the Voltage Regulator Cover in position.
5. Double Contact Regulators may be tested by first performing Step 4, then using No Load across the Battery, Stop and Restart the Engine and operate at a High RPM. Read the Voltmeter and Temperature of the Regulator and compare results with the Manufacturer's Specifications. (If the Battery Current is too high, insert the Load Control in Series with the Shunt and Alternator's "BAT" Terminal). Note after performing any adjustments, Cycle the Regulator by Stopping and Restarting Engine.

PARTS LOCATION PHOTOGRAPH

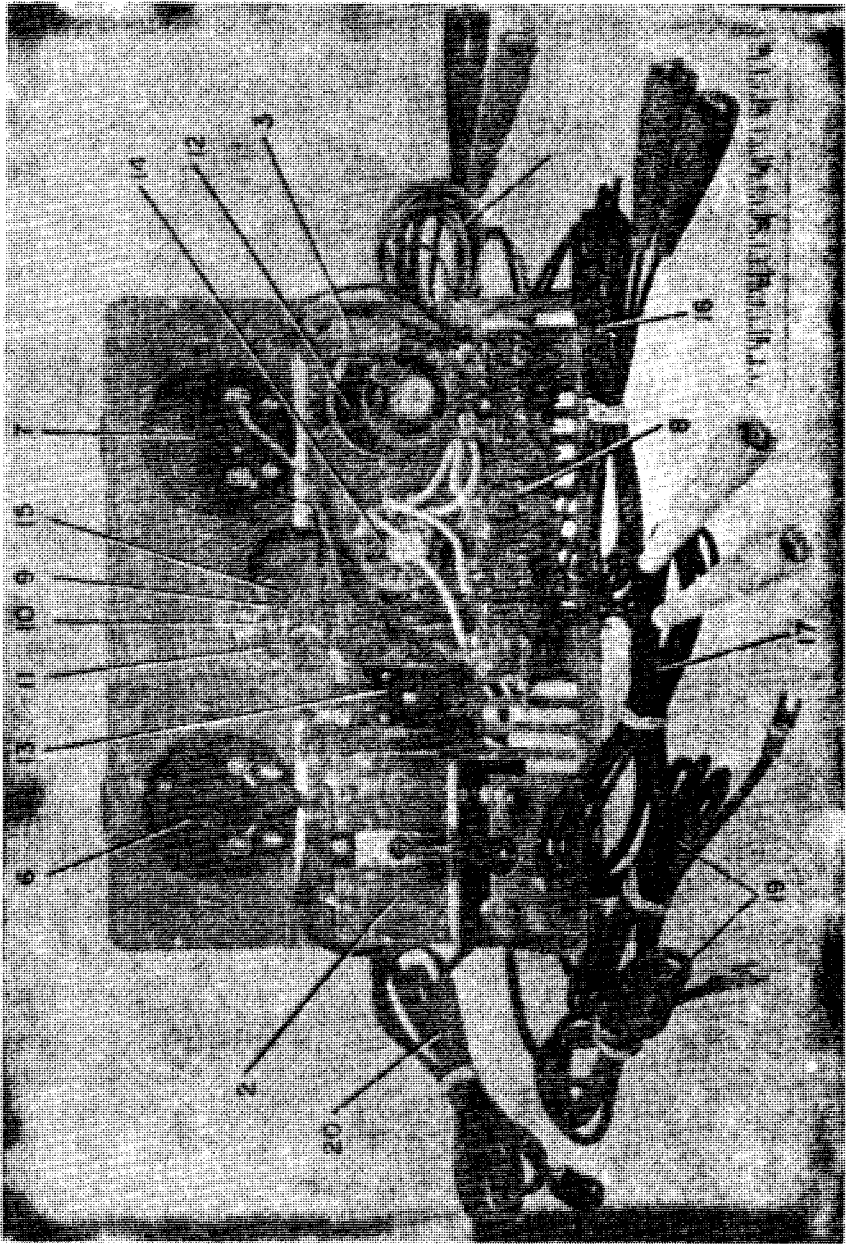


FIGURE 11.

ALLEN MODEL 30-82

GENERATOR, VOLTAGE REGULATOR TEST SET

REPLACEMENT PARTS LIST

<u>PART</u>	<u>DESCRIPTION</u>	<u>PART NO.</u>
1 Box	Box	A60313
2 Carbon Pile	Carbon Pile Complete	A60302
3 Circuit Breaker	5 Amp Circuit Breaker	8897
4 Knob	Carbon Pile & Rheostat Knob (2 Req'd)	13624
5 Knob	P. B., Volt & Fixed Resistance Sw. (3 Req'd)	16853
6 Meter	Ammeter	7957-2
7 Meter	Voltmeter	7949-2
8 Resistor	Fixed Resistance .75, .75, .75 & 4.75 ohms.	60303
9 Resistor	790 OHM	60304
10 Resistor	1590 OHM	60305
11 Resistor	3190 OHM	60306
12 Rheostat	50 OHM - 50 watt wire Rheostat	60321
13 Switch	Pust Switch A.E. & E. Co.	A7016-5
14 Switch	Fixed Resistance	60318
15 Switch	Volt Selector	13708

TEST LEADS

16 Lead	Field Rheostat 6 ft. w/clips & GREEN Insulators	A60307
17 Lead	Fixed Resistance 6 ft. w/clips & YELLOW Insulators	A60308
18 Lead	Volt 10 ft w/clips & RED & BLACK Insulators	A60309
19 Lead	Load Control 6 ft. w/spade Terminals	A60310
20 Lead	Amp 6 ft. w/Jones Plug	A60311

LOOSE PARTS

21 Clip	Copper Battery Clip w/terminal bolts (2 Req'd)	A11249
22 Lead	Jumper Lead 9 in. Long	A6875
23 Shunt	120 Amp Shunt	A60312
24 Instructions	Operating Instructions	25315
25 Lead	Jumper Lead 5 in. Long	A21334

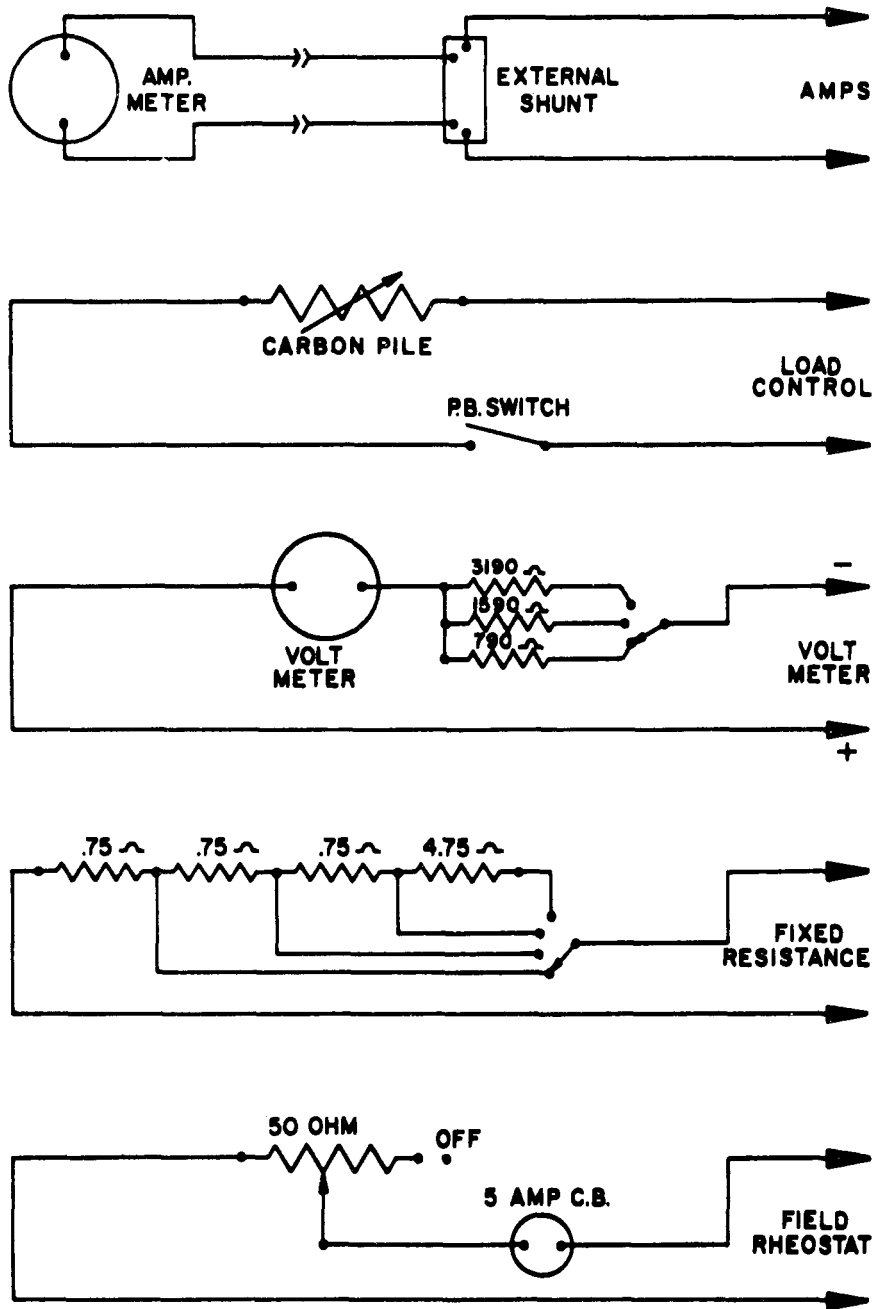


FIGURE 12

APPENDIX

BASIC ISSUE ITEMS LIST

Section I. PREFACE

1. General

This appendix is a list of basic issue items. It is composed of those items which make up the major end item of equipment, and the operator's tools and equipment that are issued with the equipment.

2. Requisition Notes

a. Repair Part Identified by Federal Stock Number.

- (1) If the item requisitioned is not furnished, or if other action is necessary, the exact nature of the action taken by the commodity command will be indicated by standard symbols on prescribed forms.
- (2) When requisitioning an item, the requesting agency will order the listed item. However, the commodity command will take necessary action to issue the exhaust stock item until stock is exhausted, whether it be an individual item, kit, set, or assembly.

b. Part To Which FSN Has Not Been Assigned. When requisitioning a C source (local procurement) item identified only by a manufacturer's part number, it is necessary that the following information be furnished the supply officer.

- (1) Manufacturer's code number (5 digit number preceding the colon in the descriptive column).
- (2) Manufacturer's part number (the number and sometimes letters, following the colon (1) above). Dashes, commas, or other marks must be included exactly as listed.
- (3) Nomenclature exactly as listed herein, including dimensions, if necessary.
- (4) Name of manufacturer of end item

(from cover of TM or manufacturer's nameplate).

- (5) Federal stock number of end item (from TM).
- (6) Manufacturer's model number (from TM or name/data plate, preferably name data plate).
- (7) Manufacturer's serial number (from name data plate).
- (8) Any other information such as type, frame number, and electrical characteristics, if applicable.
- (9) If DD Form 1348 is used, fill in all blocks except 4, 5, 6, and Remarks field in accordance with AR 725-50. Complete form as follows:
 - (a) In blocks 4, 5, and 6, list manufacturer's code and part number (as listed in descriptive column).
 - (b) In Remarks field, list noun name (repair part), end item application (FSN of end item), manufacturer's model number (end item), serial number (end item), and any other pertinent information such as frame number, type, etc.

3. Explanation of Columns

a. Source, Maintenance, and Recoverability Code (col. 1).

- (1) *Materiel numerical codes (col. 1a).* This column not required.
- (2) *Source (col. 1b).* This column indicates the selection status and source for the listed item. Source code used in this list is:

Code

c

Explanation

Obtain through local procurement. If not obtainable from local procurement, requisition through normal supply channels with a supporting statement of nonavailability from local procurement.

- (3) *Maintenance level* (col. 1c). This column indicates the category of maintenance authorized to install the listed item. Maintenance level code used in this list is:

<u>Code</u>	<u>Explanation</u>
070	Operator or crew maintenance

- (4) *Recoverability* (col. 1d). This column indicates whether unserviceable items should be returned for recovery or salvage. When no code is indicated, the item will be considered expendable. Recoverability code used in this list is:

<u>Code</u>	<u>Explanation</u>
R	Items which are economically repairable at direct and general support maintenance activities and are normally furnished by supply on an exchange basis.

b. Federal Stock Number (col. 2). This column indicates the Federal stock number which has been assigned by the Cataloging Division, Defense Logistics Center.

c. Description (col. 3). This column indicates the Federal item name (shown in capital letters) and any additional description required for supply operations. The manufacturer's code and part number are also included for reference.

<u>Code</u>	<u>Explanation</u>
01216	Allen Electric and Equipment Company

d. Unit of issue (col. 4). This column indicates the quantity to be requisitioned.

e. Quantity Authorized (col. 5). This column indicates the quantity of the listed item authorized for stockage to constitute the prescribed load.

f. Illustration (col.6). This column indicates the figure number of the illustration that depicts the listed item. When more than one item appears on an illustration, the item number is also indicated.

4. Abbreviation

amp Ampere (s)

5. Suggestions and Recommendations

The direct reporting by the individual user, of errors, omissions, and recommendations for improving this manual, is authorized and encouraged. DA Form 2028 (Recommended Changes to DA Publications) will be used for reporting these improvements. This form may be completed using pencil, pen, or typewriter. DA Form 2028 will be completed and forwarded direct to: Commanding General, Headquarters, U.S. Army Weapons Command, ATTN: AMSWE-SMM-P, Rock Island Arsenal, Rock Island, Ill. 61202.

(1) Source maintenance and recoverability code				(2) Federal stock No.	(3) Description	(4) Unit of issue	(5) Quantity incorporated in unit	(6) Illustration	
(a) Material code	(b) Source	(c) Maintenance level	(d) Recoverability					(a) Figure No.	(b) Item No.
			R	4910-270-3780	MAJOR COMBINATION The following item is to be requisitioned for initial issue only. TEST SET, GENERATOR AND VOLTAGE REGULATOR, AUTOMOTIVE : (01216:30-82) COMPONENTS OF MAJOR COMBINATION None authorized REPAIR PARTS None authorized TOOLS AND EQUIPMENT FOR TEST SET, GENERATOR AND VOLTAGE REGULATOR, AUTOMOTIVE: (01216:30-82) CLIP, BATTERY, w/terminal bolts (01216: A11249) LEAD, JUMPER, 5 in lg (01216 :A21334) LEAD, JUMPER, 9 in lg (01216 :A6875) OPERATING INSTRUCTIONS (01216: 25315) SHUNT, 120 amp (01216 :A60312)	EA	1	13	1
C	07C				CLIP, BATTERY, w/terminal bolts (01216: A11249)	EA	2	13	3
C	07C				LEAD, JUMPER, 5 in lg (01216 :A21334)	EA	1	13	5
C	07C				LEAD, JUMPER, 9 in lg (01216 :A6875)	EA	1	13	6
C	07C				OPERATING INSTRUCTIONS (01216: 25315)	EA	2	13	2
C	07C				SHUNT, 120 amp (01216 :A60312)	EA	1	13	4



Figure 13. Test set, generator and voltage regulator, automotive.

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